

Appl. No. 10/711,015
Amdt. dated April 13, 2006
Reply to Office action of March 15, 2006

REMARKS/ARGUMENTS

Claims 1-8 remain active in the case. In order to more particularly point out and distinct claim that which the applicants regard as their invention, claims 1 and 5 have
5 been amended. No new matter is introduced.

1. Request for Continued Examination:

The applicants respectfully request continued examination of the above-indicated
10 application as per 37 CFR 1.114.

2. Rejections over claims 1-4:

Claim 1 was rejected under 35 U.S.C. 102(e), for reasons of record that can be found on pages 2-4 in the Office action identified above, which is Part of Paper No./Mail
15 Date 20051112. Claim 1 was rejected because of Ngo et al. (US 6818557).

Ngo et al. teaches a method of forming SiC capped copper interconnects with reduced hillock formation and improved electromigration resistance. The method includes treating the exposed planarized surface of in-laid Cu with a plasma containing NH₃ and N₂, ramping up the introduction of trimethylsilane and then initiating deposition of a
20 silicon carbide capping layer.

Ngo teaches that after the soft NH₃ plasma treatment, the power is turned off (col. 5, lines 49-62; col. 6, lines 11-15). After 5 to 7 seconds, TMS is gradually introduced into the chamber. The TMS flow rate is ramped up to a suitable deposition flow rate, as in a plurality of stages. After the TMS has achieved a suitable flow rate, the RF power is again
25 turned on, thereby generating a plasma and depositing a capping layer of silicon carbide on the Cu surface. According to Ngo, the purpose of turning on the RF power is to deposit a silicon carbide capping layer on the copper surface, rather than making the TMS

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react with the copper surface in advance. The TMS will be adsorbed to the wafer surface, and will barely react with the copper surface even the RF power is then turned on.

The applicants submit that Ngo teaches away from that “reacting said treated surface of said copper or copper alloy under plasma enhanced chemical vapor deposition (PECVD) conditions comprising simultaneously supplying trimethylsilane or
5 tertramethylsilane and initiating plasma to make said trimethylsilane or tertramethylsilane react with said treated surface of said copper or copper alloy”, as required by the amended claim 1.

It is respectfully suggested that, in light of the above, none of the cited references,
10 alone or in combination, teaches or makes obvious all of the limitations of the amended claim 1. Allowance of claim 1 is therefore politely requested. As claims 2-4 are dependent upon claim 1, they should be allowable if claim 1 is allowed. Reconsideration of claims 2-4 is therefore politely requested.

15 3. Rejections over claims 5-8:

Claim 5 was rejected under 35 U.S.C. 103(a), for reasons of record that can be found on pages 4-8 in the Office action identified above, which is Part of Paper No./Mail Date 20051112.

Ngo teaches that after the soft NH₃ plasma treatment, the power is turned off (col. 5, lines 49-62; col. 6, lines 11-15). After 5 to 7 seconds, TMS is gradually introduced into the chamber. The TMS flow rate is ramped up to a suitable deposition flow rate, as in a plurality of stages. After the TMS has achieved a suitable flow rate, the RF power is again turned on, thereby generating a plasma and depositing a capping layer of silicon carbide on the Cu surface. According to Ngo, the purpose of turning on the RF power is to
20 deposit a silicon carbide capping layer on the copper surface, rather than making the TMS react with the copper surface in advance. The TMS will be adsorbed to the wafer surface, and will barely react with the copper surface even the RF power is then turned on.
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The applicants submit that Ngo teaches away from that “reacting said treated

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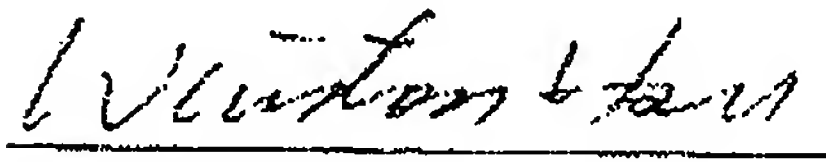
5 surface of said copper or copper alloy under plasma enhanced chemical vapor deposition
(PECVD) conditions comprising simultaneously supplying trimethylsilane or
tertramethylsilane and initiating plasma to make said trimethylsilane or tertramethylsilane
react with said treated surface of said copper or copper alloy”, as required by the amended
claim 5.

10 It is respectfully suggested that, in light of the above, none of the cited references,
alone or in combination, teaches or makes obvious all of the limitations of the amended
claim 5. Allowance of claim 5 is therefore politely requested. As claims 6-8 are
dependent upon claim 5, they should be allowable if claim 5 is allowed. Reconsideration
of claims 6-8 is therefore politely requested.

Applicants respectfully request that a timely Notice of Allowance be issued in this
case.

Sincerely yours,

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Note: Please leave a message in my voice mail if you need to talk to me. (The time in D.C.
is 12 hours behind the Taiwan time, i.e. 9 AM in D.C. = 9 PM in Taiwan.)